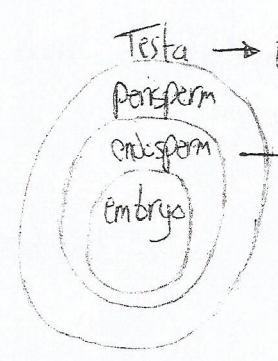


SEED

Seed
WFS
 Spallero

* seed $\Rightarrow$



Testa $\rightarrow$ protection of the embryo.

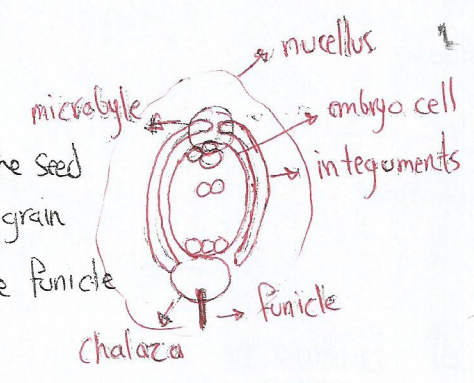
Perisperm $\rightarrow$ existed if the embryo needs more nutrition.

$\rightarrow$ Microbyle $\rightarrow$ For water transportation when the seed is germinated. entrance of pollen grain

$\rightarrow$ Hilum $\rightarrow$ The scar resulted from breaking the funicle to separate the seed.

$\rightarrow$ Chalaza

$\rightarrow$ Raphe $\rightarrow$ not existed in all seeds. Fusion of the funicle with the integument.



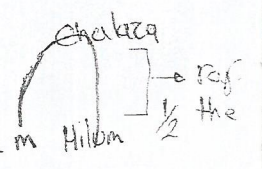
① Atropous ovule

- normal growth
- straight line



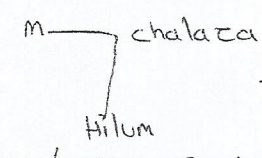
② Anatropous ovule

- orientation 180° resulted from the bent of the ovule upon the stalk m 180°
- appearance of raphe $= \frac{1}{2}$ the seed
- Chalaza at the distal end



③ Amphitropous ovule

- appearance of raphe $= \frac{1}{4}$ seed because the bent was of 90°
- The m $\hat{=}$ chalaza on a straight line perpendicular on the Hilum



- most apart from each other

④ Campitropous

- One side growth (ovule bent upon itself)
- division of the nucellus (curved)
- bent upon it self

- H, m, chalaze close to each other

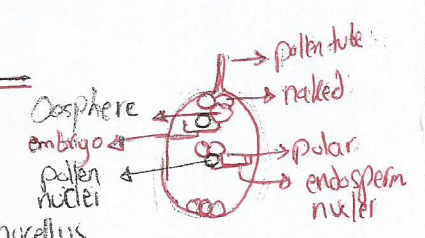
Albuminous seed & endospermic seed

embryo + endosperm
 OR
 embryo + endosperm + perisperm

$\rightarrow$ division of the nucellus

Structure ② Exalbuminous seed embryo alone

all seed enclosed within the testa.



Out growth of testa &

+ example

Arillus → From Hilum

ex: Cardamom seed

Arillode → From micropyle

Caruncle → From the tissue neighbourhood to the micropyle ex: castor seed

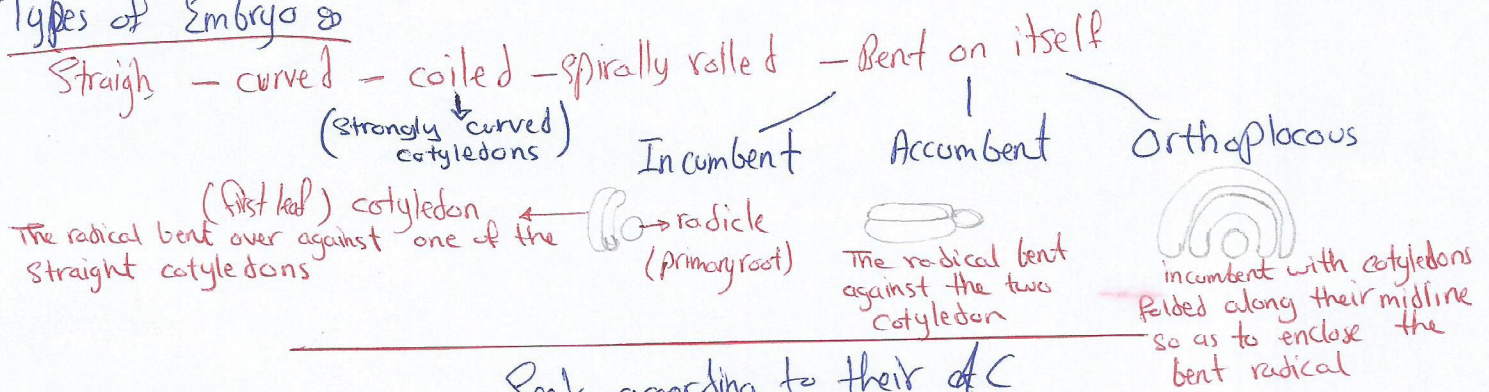
Strophiole → From the line of Raphe ex: Colchicum seed

Wing → From testa

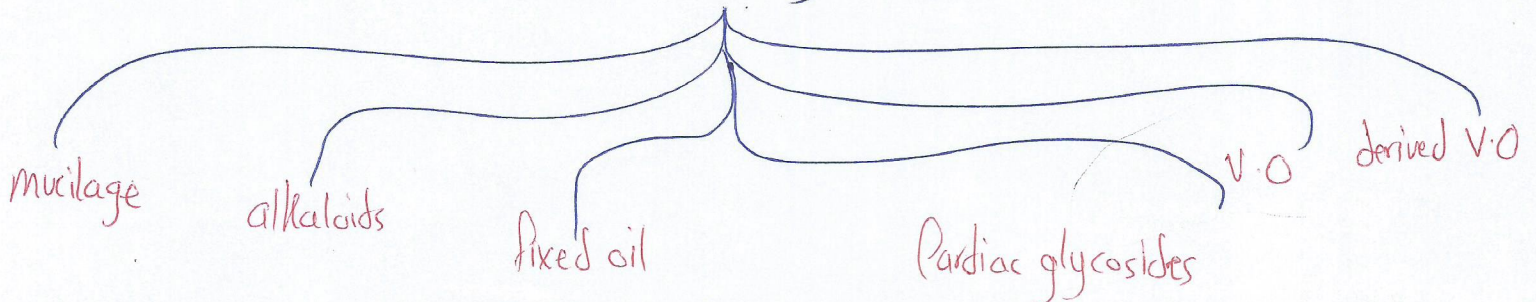
Tuft of hair → Sessile → arising from apex (no stalk)

→ Awn → stalked at apex ex: strychnanthus

Types of Embryo &



Seeds according to their d/c



Hilum

Nuxvomica seeds

Dried ripe seeds of *Strychnos nuxvomica* Family *Loganiaceae*

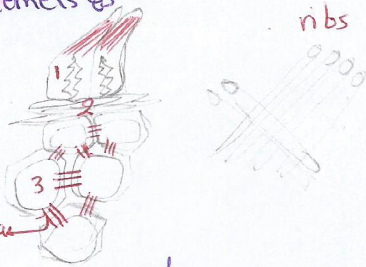
* Macroscopic characters

- Odor: odorless
- Taste: bitter persistent
- Color: greenish grey
- Shape: disc concave on one side and convex on the other side, flattened

Microscopic characters

- Outer epidermis sclerified prolonged with hair containing cells have about 10 strongly thick longitudinal ribs
- Hyaline layer parenchymatous
- Endosperm hemicellulosic walls showing Plasmodesma but no pits

Key elements



Active constituents

- Alkaloid → *strychnine* & *brucine*
Mandarin reagent → pink/violet color
seen under the microscope in the TS
 $HNO_3 \rightarrow$ orange red
- Iridoid glycoside → *laganin*
- Chlorogenic acid → *igasuric acid*

Uses

- Improve appetite and digestion
- Small dose for constipation
- Increase blood pressure for cardiac failure
- Respiratory stimulant → *strychnine*

(Brucine is less toxic than strychnine)

Nuxvomica alkaloids are toxic in large amounts as they cause respiratory convulsion → *Asphyxia* → death

Seeds: albuminous

Ovules: anatropous

Embryo

The surface is shiny sheen due to the closely appressed hairs. The hilum appears as a circular scar and connected to the micropyle by a raised ridge

Seeds containing Alkaloids

Colchicum

Dried ripe seed of *Colchicum autumnale* Family *Liliaceae*

Seed: albuminous ovule: amphitropous
embryo: straight outgrowth: strophile

Active constituents

- Alkaloid: *colchicine* in all parts of the plant
- Resin, fixed oil & glucose

Uses

- Acute gout (relieve pain & inflammation)
- Plant hormone to produce polyploidy in plant tissue & *colchicine*
- antimitotic effect - anti cancer
- treatment of Mediterranean fever

Side effects

- Hair loss - Bone marrow damage
- Kidney & liver damage
- Teratogenic damage

Chemical tests

treated with HCl → yellow color

Calabar beans

Dried ripe seeds of *Physostigma venenosum* Family *Fabaceae*

Active constituents

alkaloid: *eserine* (*physostigmine*) + *isophysostigmin*

Eserine is a liquid colorless when exposed to light & air converted to red colored *rubreserine*

↓
lower pharmacological effect (chemical test)

Uses

Parasympathomimetic action
Potentiate action of parasympathetic

- Miotic effect as *atropine* antagonist
- eye drops for *glaucoma*
eserine → blue water due to high pressure of the eye
- Antidote for poisoning
توياف

Stramonium seed Datura

Dried ripe seeds of *Datura stramonium* Family *Solanaceae*

Odor: odorless
Taste: bitter oily taste
Shape: flattened vermiform
Seed: albuminous
Embryo: coiled
Ovule: campylotropous

Active constituents

- Alkaloids: *hyoscyamine* (fresh)
Atropine (dry) ≠ optical rotation

Uses

Parasympatholytic action
action antagonizes the action of parasympathetic nervous system

1) Mydriatic drops in ophthalmology

2) Antispasmodic

3) Preoperative medicament

- Smooth muscle → facilitate breathing
- decrease salivation
- decrease bleeding
- Exert sedative effect
increase the action of general anaesthetics

Allied drugs (Ignatus beans)

The seeds of *strychnos ignatii* Family *Loganiaceae*

Active constituents

mainly *Brucine* than *strychnine*
So less toxic than *nuxvomica*

Uses

Treat cerebral (Psychological) problems such as insomnia, depression and hysteria

* Seed coat is covered with obressed hair 1) less regularly arranged 2) unligified ribs 3) devoid of satiny sheen unlike *Nuxvomica*

Chemical tests Datura

Vitalis test → violet color

Alc extract of the seed is kept in a porcelain dish - cold residue treated with conc H_2SO_4 → evaporated again → cool → add few drops of alc KOH soln

Coffee Beans &

Active constituents alkaloids caffeine, theobromine and theophylline

Uses &

① Central nervous system
Stimulant effect

② diuretic effect

③ broncho dilators
Vasoconstrictive
Smooth muscle relaxant

Special chemical tests

Mercuride test for caffeine → pink violet color

Cacao seed &

Active constituents theobromine and traces of caffeine

Uses &

① diuretic effect

② in cosmetic ointments, excellent emollient for chapped lips and hands

③ for coating pills and suppositories

④ treating edema (excess of watery fluid in the body) for people who have cardiac failure

IN L C S

H & M

raphe



Pin seed (Flax seed)

Seeds containing mucilage

Foenugreek ^{radical} ^{cotyledons}

Plantago - Ispaghula Psyllium - Flea SEED

Origins It is dried ripe seed of *linum usitatissimum* Family *linaceae*

Origins dried ripe seed of *Trigonella foenum-graecum* Family *Fabaceae*

It is dried ripe seed of *Plantago psyllium* and *Plantago albicans* Family *Plantaginaceae*

Macroscopical character

- Odor** odorless or characteristic when crushed
- taste** mucilaginous oily taste
- Color** reddish brown
- Shape** oval & flattened at one end
- Testa** smooth shiny pitted

Macroscopical character

- Odor** faint characteristic odor
- taste** mucilaginous bitter taste
- Color** yellowish brown
- Shape** rhomboidal

Active constituent

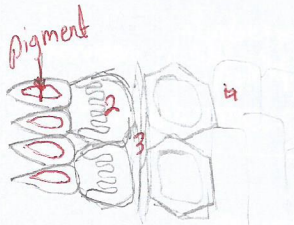
- Mucilage acidic in epidermal cells of the testa
- Fixed oil, sugars & sterols
- Irritoid glycosides

Microscopical character

- Outer layer**
 - Epidermal acidic mucilage
 - hypodermal chlorenchyma cell
- Inner layer**
 - Sclerenchymatous layer
 - Hyaline layer
 - pigment layer

Microscopical character

- Outer layer**
 - Epidermis palisade like cells
 - Hypodermis basket like cells
 - Hyaline layer parenchyma cells
- Inner layer**
 - Endosperm parenchyma containing neutral mucilage.



Swelling Factor

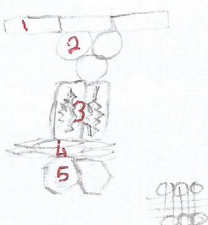
Is the volume of mucilage produced in 6 hrs from 1gm of seeds soaked in 20 ml H₂O
Plantago ovata

Psyllium Husk

Epidermal containing mucilage seeds soaked in H₂O → remove the swollen epidermis and drying

Key elements

- Mat-like structure
- pigment layer



Active constituent

- Mucilage neutral
- Alkaloids bitter taste (Trigonelline and choline)
- Proteins & amino acids
- Flavonoids
- Saponin glycosides (diagenin)

Uses

- As spice, laxative and emollient
- Oral hypoglycemic for diabetic patients
- Trigonelline inhibit liver cancer
- Alzheimer's disease → delay
- Lactative & in hormones
- Diasogenin → semi-synthesis of steroid drug such as cortisone & sex hormones

Uses

- Chronic constipation → pregnant women (very safe)
 - For anal fissures & haemorrhoids
 - Poultices and demulcent
- Senna* / *Cascara* → pregnancy
↓
anthraquinone → contraction of stomach

Active constituent

- Acidic mucilage 6%
- linamarin Cyanogenic glycoside
- Fixed oil & unsaturated Saturated (omega 3, omega 6)

Uses

- Poultice to convey heat & moisture to relieve pain
- Omega 3 → Rheumatoid arthritis → reduction of (VLDL) & (LDL)
- hypercholesterol → reduce blood pressure - anemia
- Bulk forming laxative for constipation
- after boiling used in painting

Special test

- +ve with Sudan III → oil
- +ve with ruthenium red → acidic mucilage
- Grignard's paper test → linamarin

linamarin + H₂O → linamarase active
→ glucose + acetocyanhydrin
acetone + HCN → HCN in stomach deactivate it

Seeds Albuminous

Ovule Anatropous

Embryo straight

It will eliminate faster than decomposition of stomach
Rhodanase enzyme → SCN

Special test

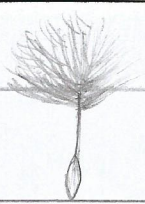
- Froth test for saponin
- +ve → methylene blue → n-mucilage
- +ve → Sudan III → Fixed oils

Seed Albuminous

ovule Anatropous

Embryo accumbent
Prevention of hyperlipidemia and atherosclerosis

FLIP



Seeds containing cardiac glycosides

Semen straphanthus seeds

Dried ripe seeds of *S. kombe*, *S. hispidus* and *S. gratus* Family Apocynaceae deprived of their Awn.

Macroscopical characters

Odor & odorless

Color & grey

Seed & Albuminous

Embryo & straight

Taste & bitter taste

Shape & lanceolate

Ovule & Anatropous

Outgrowth & Awn

Microscopical characters

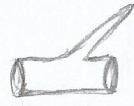
One integument only &

1) Epidermis prolonged with hair, closely appressed supported by one lignified rib

2) Hagaline layer → parenchyma cells

Key Elements

Epidermis prolonged with hair



Active constituents

S. kombe → Cardiac glycoside → *le-strophanthin*

S. gratus → Cardiac glycoside → *Gi-strophanthin* (Ouabin) → is poorly absorbed orally + more stable compound used for biological standardization of cardiac glycosides + exhibits rapid onset of action

Uses

- 1) Cardiac stimulant & ↑ cardiac contractibility
- 2) Chronic heart failure → *le-strophanthin*
- 3) Acute & emergency heart failure via intravenous → Ouabin
- 4) Efficient diuretic → causes toxicity
- 5) less cumulative than Digitalis
- 6) less liable to produce gastrointestinal irritation than Digitalis

Special chemical tests

Keller Killiani test → 2 deoxy sugar → Brown ring + bluish green in the upper solution
Powder treated with H_2SO_4 (80% or 60%) → endosperm acquire green color (*S. kombe* and *S. hispidus*) and red color (*S. gratus*)

"Digitalis is a drug of choice in USA"
"Straphanthus is a drug of choice in Europe"

Seeds containing Fixed oils

Castor Seed

* Dried ripe seeds of *Ricinus communis*
Family Euphorbiaceae

outgrowth $\Rightarrow$ Caruncle
odor $\Rightarrow$ slight odor
taste $\Rightarrow$ acidic oily
color $\Rightarrow$ grey
Shape $\Rightarrow$ oval

Active constituent $\Rightarrow$

- 1) Ricin $\rightarrow$ very toxic natural protein
cause vomiting, convulsion and death
- 2) Ricinine $\rightarrow$ indicator of ricin exposure

Uses $\Rightarrow$

- 1) purgative ^{زيت السمك}
- 2) for expelling worms

Chemical test $\Rightarrow$

Sudan III $\rightarrow$ red (oil)

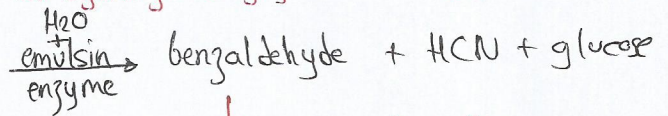
"The oil is safe because the poison remains in the seed"

Bitter Almond Seed

* Dried ripe seeds of *Prunus amygdalus*
va amara family Rosaceae.

Active constituent $\Rightarrow$

- 1) Fixed oil
- 2) cyanogenic glycoside Amygdalin



$\downarrow$
Volatile oil $\rightarrow$ Food flavoring

Uses $\Rightarrow$

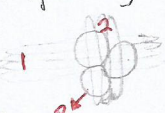
- 1) Anti-cancer $\leftarrow$ Amygdalin
- 2) anti hypercholesterolemia $\uparrow$ HDL $\leftarrow$ Fixed oil

"Get rid of HCN by washing with alkali
 $\rightarrow$ Rectification"

Sweet Almond seed uses $\Rightarrow$

- 1) Non-starchy food for diabetic patients
- 2) anti-oxidant
- 3) anti hypercholesterolemia

Seeds containing Volatile Oil

<u>Cardamom</u> الهلل Dried ripe seeds of <i>Elettaria</i> <i>Cardamomum</i> Family <i>Zingiberaceae</i> Seeds Albuminous containing perisperm Embryos straight Outgrowths Anillus from hilum odor strong aromatic color greyish green taste pungent <u>Microscopical characters</u> Outer coat 1) prosenchymatous epidermal layer 2) Hyaline layer → parenchyma cells 3) Oily layer  <u>Key elements</u> 1) Prosenchymatous transverses by hypodermis 2) Anillus <u>Active constituents</u> 1) Volatile oil + Suban III → red <u>Uses</u> 1) Aids digestion 2) dyspepsia عسر هضم 3) halitosis → bad mouth odour "The perisperm is formed of starch granules" *	<u>Nutmeg</u> بزر الطيب Dried ripe seed of <i>Myristica fragrans</i> Family <i>Myristicaceae</i> Seed Albuminous (+ perisperm) Outgrowths Mace (It's arillode and testa of <i>Myristica fragrans</i> F. <i>Myristicaceae</i>) <u>Active constituents</u> Volatile oil & myristicin and <u>Elemicin</u> has the same stimulant and psychonimetic effect as <u>Amphetamine</u> <u>Uses</u> 1) As spice, anti-oxidant 2) Stimulant and carminative in folk medicine Myristicin and elemicin exert hallucinogenic effect in large doses Kernel is the main structure of nutmeg *	<u>Nigella seed</u> <u>Black seed</u> ابيض Dried ripe seed of <i>Nigella</i> <i>Sativa</i> Family <i>Ranunculaceae</i> <u>Active constituents</u> Volatile oil thymoquinone and dithymoquinone <u>Uses</u> Is a medicine for every disease except death Respiratory tract conditions
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BCN